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Improving Solar Gain Control Design Strategies in Residential Building Located in Hot Arid Areas

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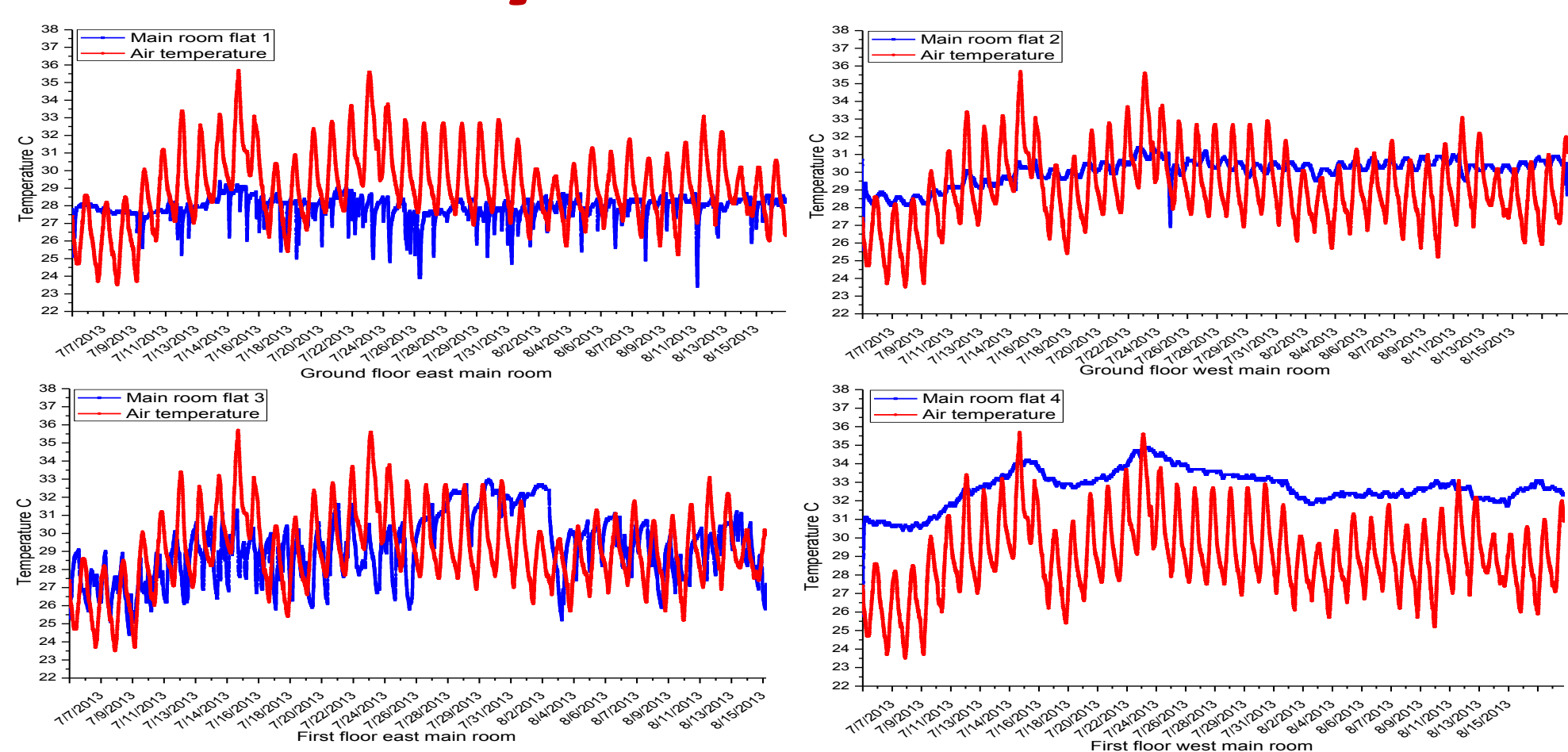
Overview

This research investigates the thermal performance of the building using the inside and outside temperature, and the on/off state of the air conditioner. This is significant because recently-built residential buildings in Libya provide a poor quality indoor environment and require a huge amount of energy to run the air conditioning.

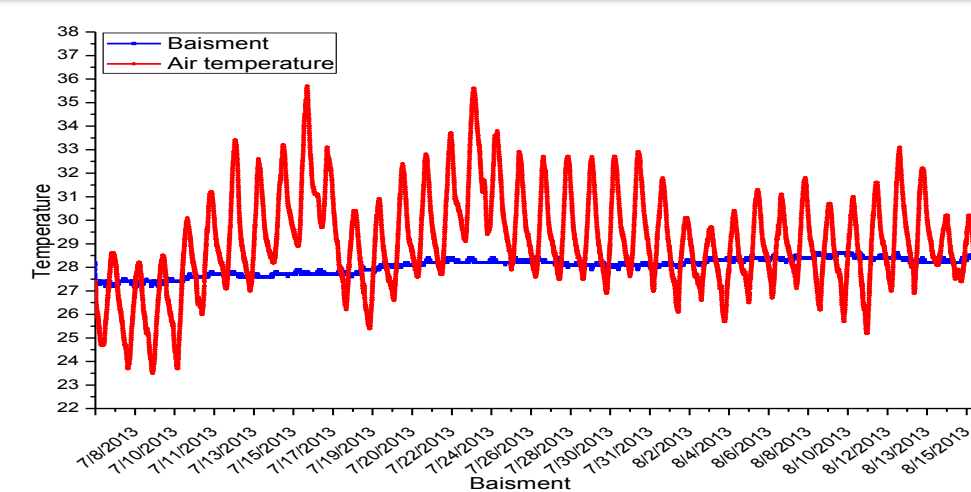
Objectives

- To investigate indoor and outdoor temperatures and energy consumption.
- To develop guidelines for solar control devices and strategies for residential building in hot arid climates to enhance comfort conditions.
- To provide the guidance needed by building designers in selecting the most appropriate tool for designing solar control devices.

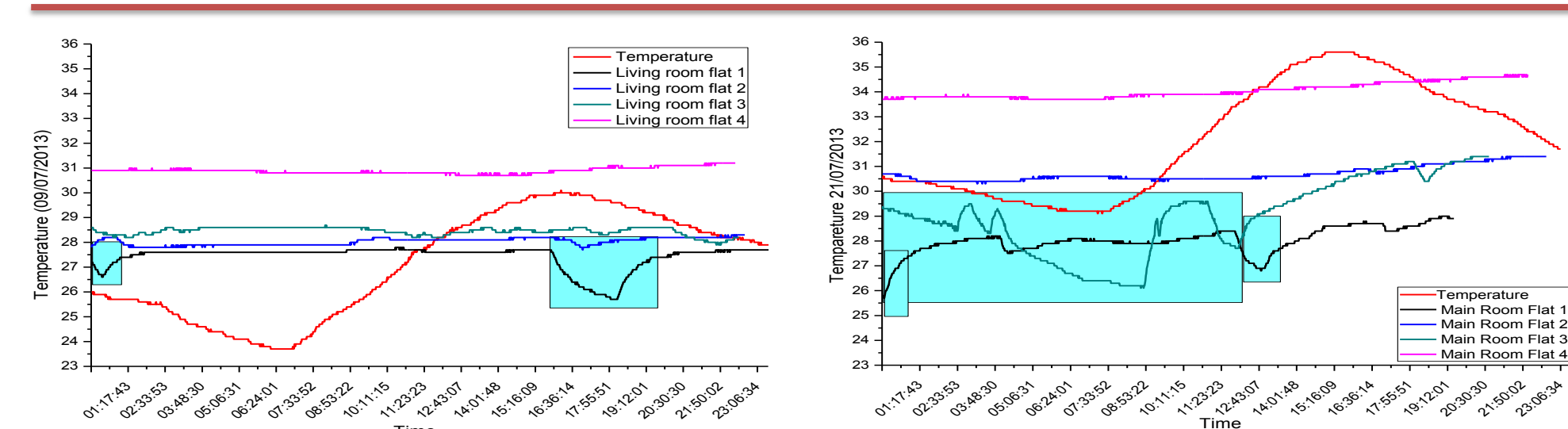
Analysis and Discussion



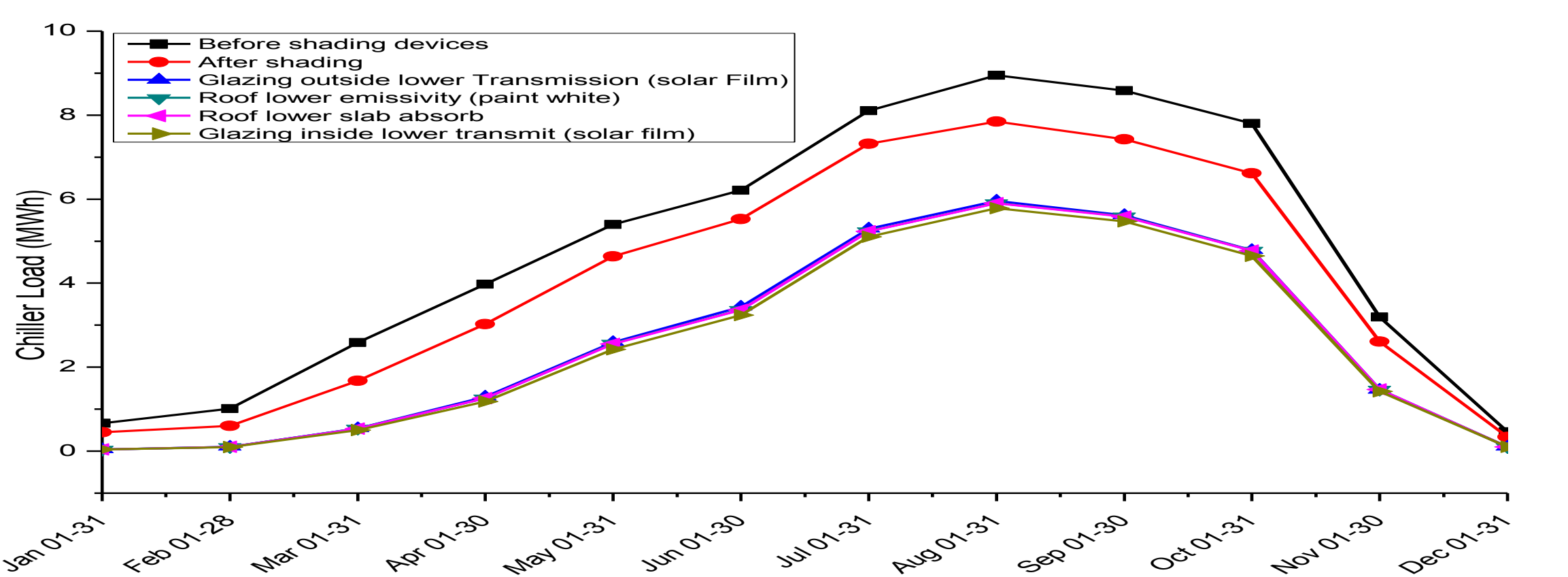
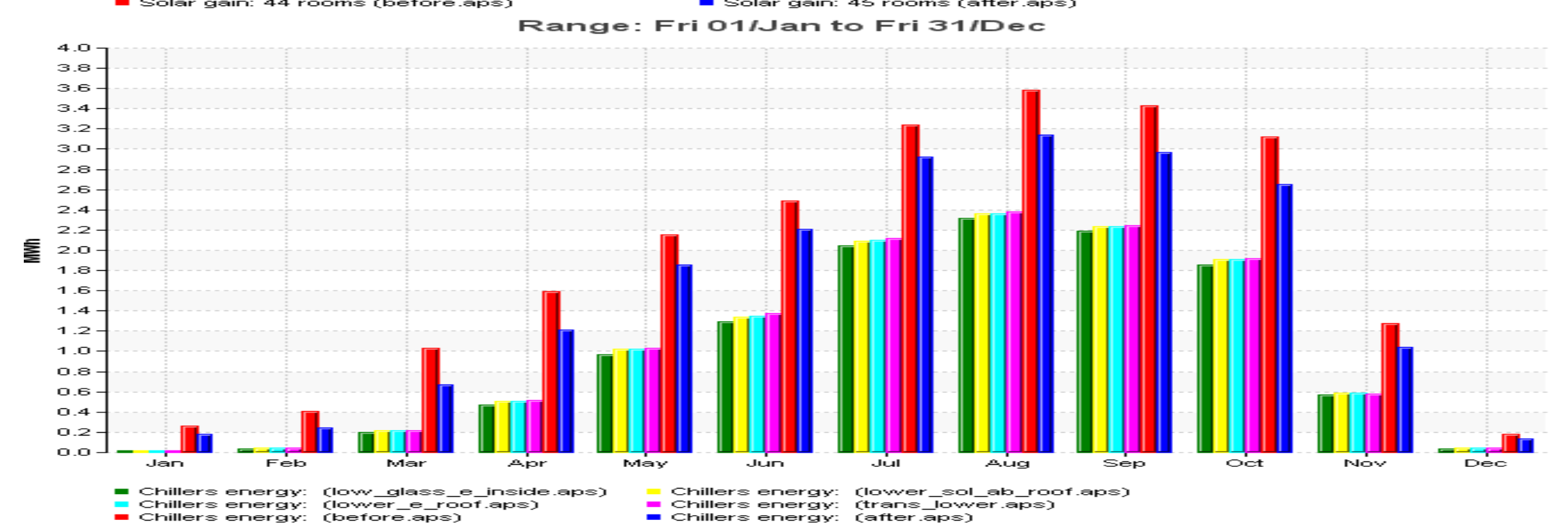
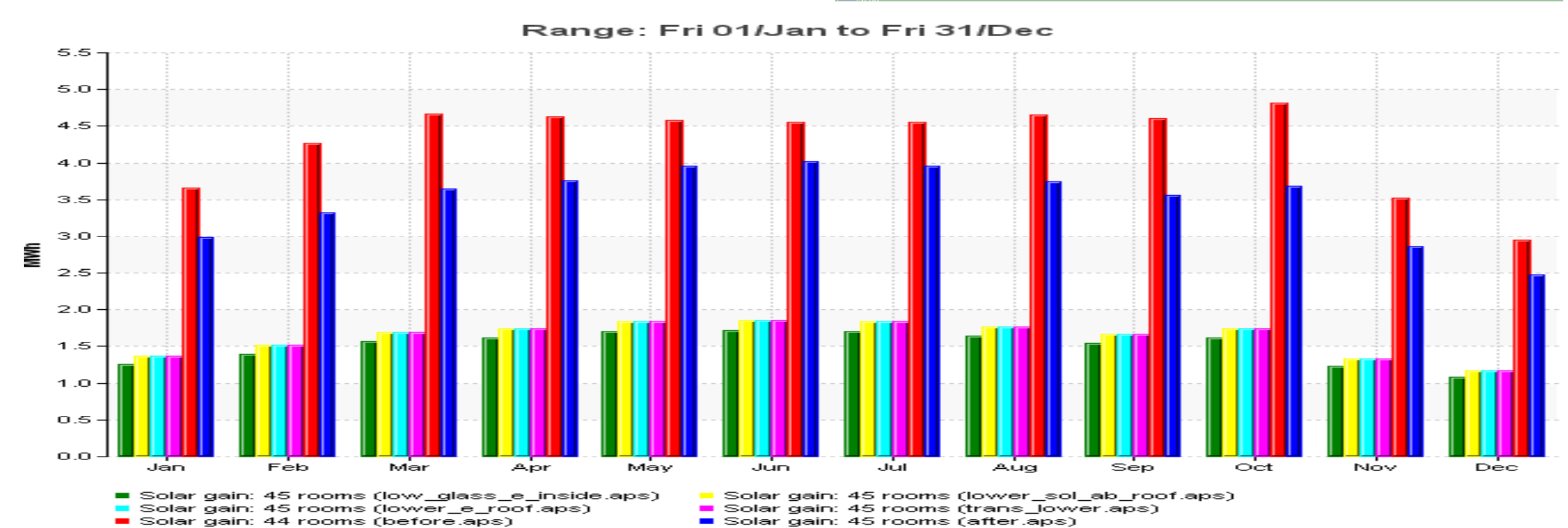
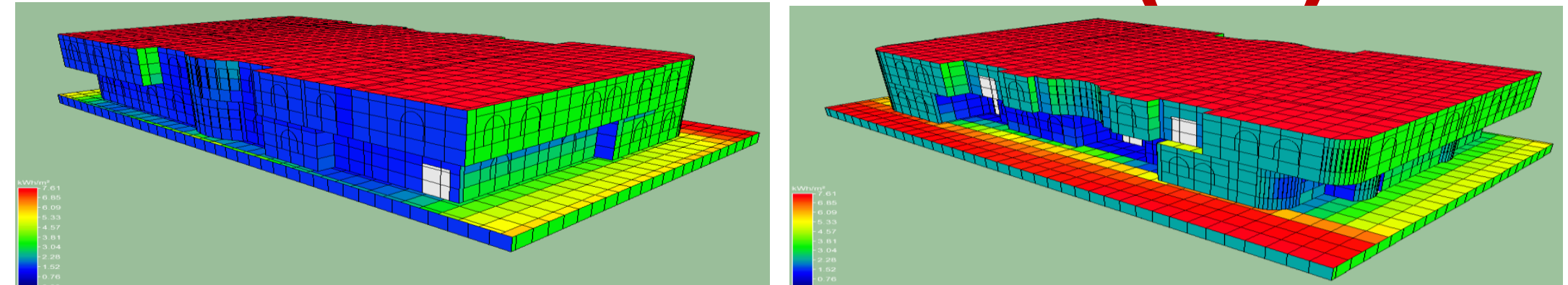
Basement temperature
Is not affected much by
the outside temperature.



The roof absorbs the solar heat and in the middle of the day the surface can reach up to 65°C, the difference between the day and night temperature up to 30°C.



Simulation Results (IES)



Conclusion

- Roof surface is the most significant heat absorber in the building.
- whenever the outside temperature increase the electricity consumption of the building increases.
- Flats located in ground floor use the conditioner during the day while flats in first floor use it more at night due to heat transfer (Time lag).
- It is clear that the basement temperature is not affected by the outside temperature.

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